

CLAIMS

1. A spectrometry instrument and an exchangeable accessory therefor including a manually operable mechanism for attaching the exchangeable  
5 accessory to the instrument, the mechanism including a manually rotatable camming means associated with one of the accessory or the instrument, a male member associated with the other of the accessory or the instrument, the male member having a camming surface which is engageable by the camming means, wherein the accessory is positionable on the instrument in a  
10 predetermined location and the camming means is manually rotatable to engage the camming surface of the male member and thereby lock the accessory on the instrument in the predetermined location.
2. A spectrometry instrument and an exchangeable accessory therefor as  
15 claimed in claim 1 wherein the camming means includes a body having a recess formed therein, the recess having a curved camming surface which interacts with the camming surface of the male member.
3. A spectrometry instrument and an exchangeable accessory therefor as  
20 claimed in claim 2 wherein the camming surface of the male member is substantially spherical, and the recess of the camming means has a substantially complementary shape.
4. A spectrometry instrument and an exchangeable accessory therefor as  
25 claimed in any one of claims 1 to 3 wherein the male member is biased in a direction towards the instrument or accessory with which it is associated, whereby engagement of the camming means with the camming surface of the male member moves the male member against the bias.
- 30 5. A spectrometry instrument and an exchangeable accessory therefor as claimed in any one of claims 1 to 4 wherein the camming means and male member are substantially centrally located of facing surfaces of the instrument and the accessory.

6. A spectrometry instrument and an exchangeable accessory therefor as claimed in any one of claims 1 to 5 wherein facing surfaces of the instrument and the accessory include projections and complementary recesses for establishing said predetermined location.

5

7. A spectrometry instrument and an exchangeable accessory therefor as claimed in claim 5 wherein the camming means includes a shaft which extends to a peripheral surface of the instrument or accessory with which the camming means is associated, and a handle or knob on the shaft adjacent said peripheral surface for facilitating manual operation of the camming means.

10

8. A spectrometry instrument and an exchangeable accessory therefor as claimed in any one of claims 1 to 7 wherein the camming means is associated with the accessory and the male member is associated with the instrument.

15

9. A spectrometry instrument including an electrical circuit for identifying any one of a plurality of exchangeable accessories which are connectable to the instrument, the electrical circuit including a voltage source and means for generating an identifying voltage therefrom, wherein each accessory includes at least one circuit element such that connection of an accessory to the instrument alters the identifying voltage to a value which is uniquely dependent upon the accessory which is connected to the instrument.

20

10. A spectrometry instrument as claimed in claim 9 wherein the means for generating an identifying voltage from the voltage source is a voltage divider.

25

11. A spectrometer as claimed in claim 9 or claim 10 wherein the voltage source and means for generating an identifying voltage provide an open electrical circuit such that in the absence of an accessory, the identifying voltage becomes the voltage of the voltage source thereby identifying the absence of an accessory.

30

12. A spectrometer as claimed in claim 11 wherein the at least one circuit element of an accessory completes said open electrical circuit.

13. A spectrometer as claimed in claim 12 wherein the at least one circuit element of an accessory is a circuit link which connects the electrical circuit of the instrument to the instrument ground or a predetermined one of a plurality of voltages of the instrument, depending on the accessory.

5

14. A spectrometer as claimed in claim 11 wherein the accessory includes a plurality of circuit elements which complete said open electrical circuit.

10

15. A spectrometer as claimed in claim 9 wherein the at least one circuit element is a winding of an electrical motor of an accessory, whereby the identifying voltage is altered to a value which uniquely identifies the presence of the electrical motor.

15

16. A spectrometer as claimed in claim 9 wherein the electrical circuit of the instrument additionally provides for recognition of the presence of an electrical motor in an accessory.

20

17. A spectrometer as claimed in claim 16 wherein the winding of the motor completes an electrical circuit of the instrument which includes a voltage divider whereby a logic high signal is generated by the presence of the winding and a logic low signal in the absence of the winding.

25

18. A spectrometer as claimed in any one of claims 9 to 17 including a computer having a microprocessor for reading the identifying voltage and which thereby identifies the accessory connected to the instrument.

30

19. A spectrometer as claimed in claim 18 wherein the computer is programmed to automatically load programmes for operating the instrument in measurement regimes involving the accessory which is connected to the instrument.

20. A method of determining a phosphorescence decay characteristic of a sample, or at least a portion thereof, including

i) exposing the sample to a first excitation flash of light,

- ii) measuring the intensity of a decaying phosphorescence light signal from the sample caused by the first excitation flash at each of a sequence of measurement points which commence a controlled time after the first excitation flash and are separated by controlled times,
- 5 (iii) exposing the sample to a second excitation flash of light and
- (iv) measuring the decaying phosphorescence light signal from the sample caused by the second excitation flash at each of a sequence of measurement points which commence a controlled time after the second excitation flash and are separated by controlled times, wherein the time  
10 instants to the first and subsequent measurement points from the second excitation flash lie between the first and subsequent measurement points respectively from the first excitation flash,
- (v) assembling the phosphorescence measurements into time sequence to produce a phosphorescence decay characteristic, or a portion thereof,  
15 for the sample.

21. A method as claimed in claim 20 including repeating steps (iii) and (iv) in respect of further excitation flashes of light, respectively, wherein the further phosphorescence measurements for each such further excitation flash are  
20 taken at controlled times such that in step (v) each said further phosphorescence measurement is interleaved between phosphorescence measurements resulting from earlier excitation flashes.

22. A method as claimed in claim 20 or 21 wherein the controlled times are  
25 such that the time intervals between the assembled phosphorescence measurements of step (v) are equal.

23. A method as claimed in claim 20 or 21 wherein the controlled times are such that the time intervals between the assembled phosphorescence  
30 measurements of step (v) vary from one interval to the next.

24. A method as claimed in claim 20 or claim 21 wherein the controlled times separating the first and subsequent measurement points of the decaying phosphorescence light signal from, respectively, the first and second and any

subsequent excitation flashes are determined prior to commencement of the method.

25. A method as claimed in claim 20 or claim 21 wherein the controlled times  
5 separating the first and subsequent measurement points of the decaying phosphorescence light signal from, respectively, the first and second and any subsequent excitation flashes are determined during the method.

26. A method as claimed in claim 25 wherein the controlled time between  
10 successive measurement points of the decaying phosphorescence signal caused by an excitation flash is determined to be greater than a time for measurement and digitization of data from a previous measurement point.

27. Apparatus for determining a phosphorescence decay characteristic of a  
15 sample or at least a portion thereof comprising a spectrophotometer and a means for controlling the spectrophotometer, wherein the means for controlling is arranged to acquire sequential phosphorescence emission measurements data from each of a number of excitation cycles applied to a sample in the spectrophotometer and to assemble that data into a correct time sequence to  
20 define a phosphorescence decay characteristic, or portion thereof, for the sample.

28. Apparatus as claimed in claim 27 wherein the spectrophotometer  
includes a data acquisition circuit for the sequential phosphorescence emission  
25 measurements data, the data acquisition circuit including a sample and hold stage followed by an analog to digital conversion stage from which the data is acquired by the means for controlling, wherein the means for controlling is arranged for sequential phosphorescence emission measurements from each excitation cycle to be taken at time intervals which are longer than the time  
30 required for conversion of measurement data to occur in the analog to digital conversion stage and be acquired by the means for controlling the spectrophotometer.

29. Apparatus as claimed in claim 28 wherein the means for controlling is arranged for a first measurement of phosphorescence emission from the first and subsequent excitation cycles to be respectively offset in time such that the first measurement resulting from a second excitation cycle follows the first measurement resulting from a first excitation cycle, and the first measurement resulting from a third excitation cycle follows the first measurement resulting from the second excitation cycle, and likewise for subsequent excitation cycles, whereby the assembly of the measurements data into a correct time sequence results in the measurements from the second and subsequent excitation cycles being interleaved with the measurements from the first excitation cycle.

30. Apparatus as claimed in claim 27, 28 or 29 wherein the means for controlling the spectrophotometer is a programmable computer.

31. Apparatus as claimed in any one of claims 27 to 30 wherein the spectrophotometer includes an exchangeable accessory, the apparatus including a manually operable mechanism for attaching the exchangeable accessory to the instrument, the mechanism including a manually rotatable camming means associated with one of the accessory or the instrument, a male member associated with the other of the accessory or the instrument, the male member having a camming surface which is engageable by the camming means, wherein the accessory is positionable on the instrument in a predetermined location and the camming means is manually rotatable to engage the camming surface of the male member and thereby lock the accessory on the instrument in the predetermined location.

32. Apparatus as claimed in any one of claims 27 to 30 wherein the spectrophotometer includes an electrical circuit for identifying any one of a plurality of exchangeable accessories which are connectable to the instrument, the electrical circuit including a voltage source and means for generating an identifying voltage therefrom, wherein each accessory includes at least one circuit element such that connection of an accessory to the instrument alters the identifying voltage to a value which is uniquely dependent upon the accessory which is connected to the instrument.

33. Apparatus as claimed in claim 31 wherein the spectrophotometer further includes an electrical circuit for identifying any one of a plurality of exchangeable accessories which are connectable to the instrument, the  
5 electrical circuit including a voltage source and means for generating an identifying voltage therefrom, wherein each accessory includes at least one circuit element such that connection of an accessory to the instrument alters the identifying voltage to a value which is uniquely dependent upon the accessory which is connected to the instrument.